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(2)

**PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
MK3 MOD 0 SIGNAL CONTAINER  
FOR  
PACKING GROUP II  
SOLID HAZARDOUS MATERIALS**

**BY:**

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13. ABSTRACT (Maximum 200 words)  The MK 3 MOD 0 Signal Container (MIL-C-18875) was tested for conformance to Performance Oriented Packaging criteria established by the United Nations Transport of Dangerous Goods and Code of Federal Regulations 49 CFR. The container was tested with a gross weight of 11 pounds (5 kilograms) and met all requirements.			
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## **INTRODUCTION**

The MK3 Mod 0 Signal Container was tested to ascertain whether the container would meet the requirements of Performance Oriented Packaging (POP) as specified by the United Nations Recommendations on the Transport of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the rulings specified by the Department of Transportation Performance Oriented Packaging Standards, 49 CFR Part 106 et al. Federal Register/Vol. 56, No. 245/Friday, December 20, 1991/Rules and Regulations. The objectives were to evaluate the adequacy of the container in protecting and retaining the kits when secured with appropriate dunnage.

The MK 3 Mod 0 Signal Container is a sealed aluminum container used primarily for shipment and storage of small signals and signal kits. Figure 1 shows the container open, with the fiberboard liner folded back and a typical load of twelve MK13 signals. The closed container is shown in Figure 2.

## **TESTS PERFORMED**

### **1. Drop Test**

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.3. Five containers were used during the test series, one for each drop. The drop height was 1.2 meters and the drop sequence was as follows:

- a. Flat on Bottom
- b. Flat on Top
- c. Flat on Long Side
- d. Flat on Short Side
- e. On a Corner

The test was performed at ambient temperature ( $70^{\circ} \pm 20^{\circ}\text{F}$ ). The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

### **2. Stacking Test**

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.6. Three different containers were used, each with a stack weight of 325 pounds. This weight represents the load superimposed on the bottom container of a sixteen-foot stack of MK3 containers weighing 11 pounds each. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.

Figure 1  
MK 1 Mod 0 Signal Container with a  
typical load of twelve MK 13 Mod 0  
Barbed Smoke and Illumination Signals.

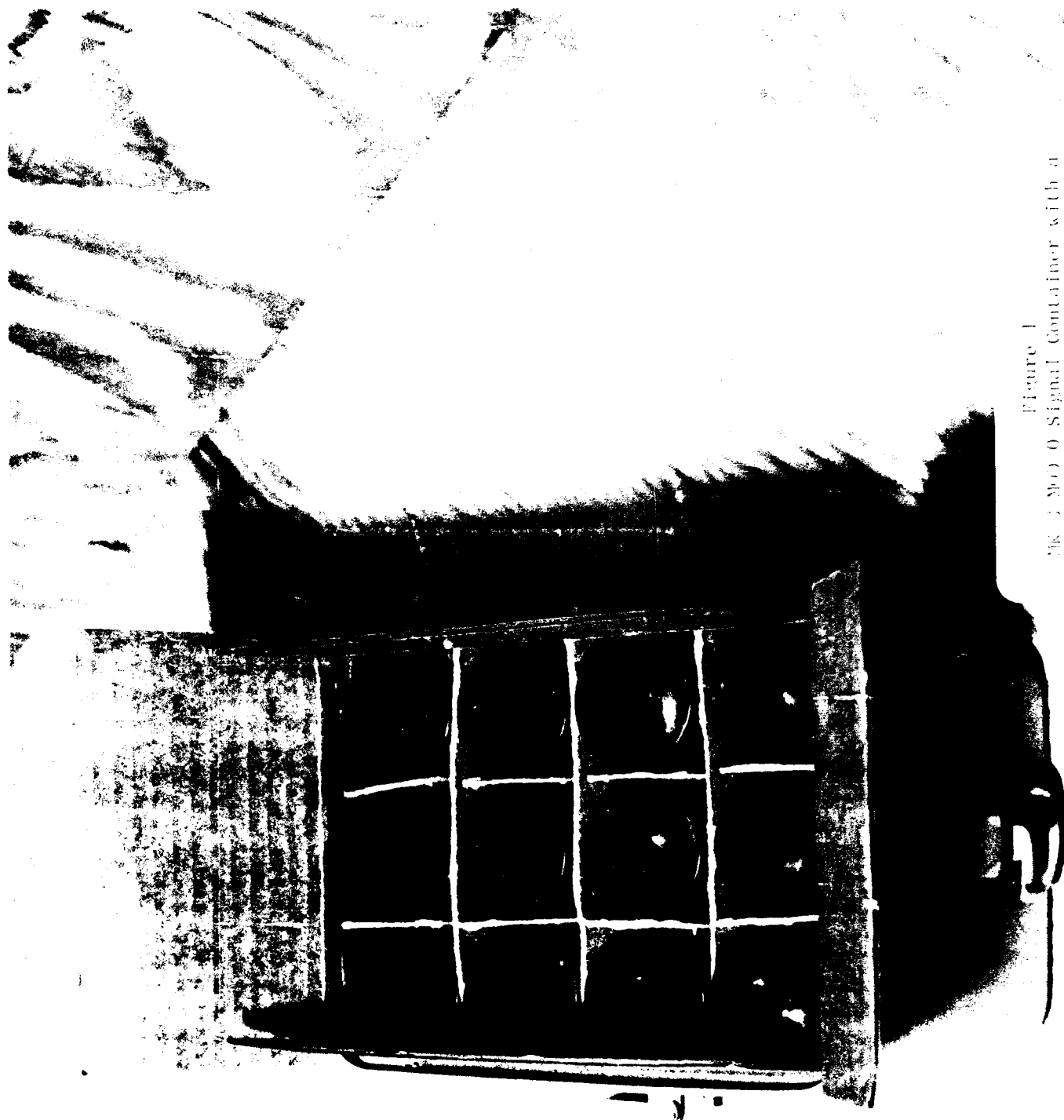




Figure 1  
A 3000 signal contour.

### 3. Base Level Vibration Test

This test was performed in accordance with the Federal Register/Vol 56, No. 245/Friday, December 20, 1991/Rules and Regulations. Three sample containers were loaded with sand and closed as for shipment. Each container was placed on a vibrating platform that had a vertical double-amplitude (peak-to-peak displacement) of one inch. The packages were constrained horizontally to prevent them from falling off the platform, but were free to move vertically, bounce and rotate. The test was performed for one hour at a frequency that caused each point of the container bottom to be raised from the platform to such a degree that a 1.6mm thick metal strip could be passed between the bottom of any package and the platform.

#### PASS/FAIL (UN CRITERIA)

The criteria for passing the drop test is outlined in Paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle (e.g., a plastic bag), even if the closure is no longer sift-proof".

The criteria for passing the stacking test is outlined in Paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages".

#### PASS/FAIL (FEDERAL REGISTER CRITERIA)

The criteria for passing the Base Level Vibration Test is outlined in the Federal Register/Vol. 56, No. 245/Friday, December 20, 1991/Rules and Regulations and states the following: "Immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength."

#### TEST RESULTS

##### 1. Drop Test

Satisfactory.

##### 2. Stacking Test

Satisfactory.

##### 3. Base Level Vibration Test

Satisfactory.



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## **DISCUSSION**

### **1. Drop Test**

After each drop the container was inspected for any damage which would be cause for rejection. Final inspection revealed minor damage to the boxes, but no spillage of contents.

### **2. Stacking Test**

Three containers were individually tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration to the container as a result of this test.

### **3. Base Level Vibration Test**

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. All latches remained fastened and there was no evidence of leakage of contents.

## **REFERENCE MATERIAL**

United Nation's "Recommendations on the Transport of Dangerous Goods", ST/SG/AC.10/1, Revision 6

Department of Transportation Performance Oriented Packaging Standards, 49 CFR Part 106 et al. Federal Register/Vol. 56, No. 245/Friday, December 20, 1991/Rules and Regulations

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# DATA SHEET

**CONTAINER:**  
MK3 Signal Container

**POP MARKING:**



4B1/Y5/S/\*\*  
USA/DOD/NAD

**Type:** 4B1

**UN Code:** 1.4G

**Specification Number:**  
MIL-C-18875

**Material:**  
Aluminum

**Gross Weight:**  
5.0 kg  
(11.0 pounds)

**Dimensions:**  
.22 m L x .18 m W x .16 m H  
(8.7" L x 6.9" W x 6.4" H)

**Closure (Method/type):**  
Latches (4 each)

**Tare Weight:**  
1.3 kg  
(2.9 pounds)

**Additional Description:** MK13 and MK124 signals packed in accordance with Drawing 10001-2128332. Lifeboat Signal Kits packed in accordance with Drawing 53711-6869827. Container has fiberboard liner and chipboard partitions.

## PRODUCTS:

Marine Smoke and Illumination Signal  
MK13 Mod 0, L275, 1370-00-309-5028  
MK124 Mod 0, L283, 1370-01-030-8330  
Lifeboat Signal Kit, No NSN assigned

**Proper Shipping Name:** Signal Devices, Hand

**United Nations Number:** 0191

**United Nations Packing Group:** II

**Physical State:** Solid

**Amount Per Container:**

Marine Smoke and Illumination Signals: 12  
Lifeboat Signal Kit: 1

**Net Weight:** Varies

## TEST PRODUCT:

**Name:** Sand  
**Physical State:** Solid

**Size:** N/A

**Quantity:** N/A

**Dunnage:** None

**Gross Weight:** 5.0 kg (11.0 lbs.)